

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

**MAIL STOP NON-FEE AMDT (PATENT)**

Applicants: Tavares, Bruce A. and Nelson, Bart J.  
Application's Title: POWDER METAL MIXTURE INCLUDING MICRONIZED CELLULOSE FIBERS  
Serial No. 10/758,032 Filed: 14 January 2004(01/14/2004)  
Group Art Unit: 1742 Examiner: NGOCLAN T. MAI  
Docket No.: 4588-00003B



DECLARATION UNDER 37 C.F.R. 1.132 OF DONALD A. KUBIK

I, Donald Alfons Kubik, residing at P. O. Box 1173, in the City of Dickenson, County of Stark, and State of North Dakota 58602, a citizen of the United States of America, do hereby solemnly declare:

1. I was awarded a Bachelor of Science (Chemistry) degree in 1962 from Dickenson State University, and a Master of Science (Chemistry) degree in 1964 from University of North Dakota.

After teaching chemistry at Jamestown College in North Dakota, I was employed in 1966 by the 3M Corporation in its Research & Development Department in Minneapolis.

I went back to University of North Dakota to earn a Doctor of Philosophy (Ph.D.) degree in 1973 and was re-employed by 3M until 1978 when I was employed by Northern Technologies International Corporation, where I am currently employed.

2. I have studied and understand the disclosure of the above-identified patent application, and the office action citing the article titled "The Effect of Microcrystalline Cellulose on the Mixing and Compaction Response of Ferrous Powders" by L. D. Jones et al in Powder Technology.

I note that under the heading "Production and properties of microcrystalline cellulose" it is stated that:

"Microcrystalline cellulose (MCC) (Table 1) is not a chemical derivative; it is a purified,

*depolymerized*  $\alpha$ -cellulose derived from fibrous plants. During the manufacturing process, *cellulose is chemically cleaved*, at the 1,4- $\beta$ -glycosidic linkages, into shorter fragments. This *chemical degradation* can be accomplished by several processes such as thermal, oxidative, enzymatic and acid hydrolysis. It is this latter method of acid hydrolysis which is employed in the manufacture of MCC.” (italics supplied)

The term “depolymerized” indicates that the original, polymeric cellulose is no longer in polymer form. Though the article does not provide details of how the depolymerized cellulose is recovered in microcrystalline form, it states:

“During hydrolysis, acid penetrates the less organized or amorphous areas of the fiber at a rate greater than into the crystalline areas. These low ordered regions are cleaved to sugars or short chain polymers which are soluble and thus removed, leaving only the highly ordered crystalline regions of the fiber. The resulting fiber is clearly weakened and brittle and in the dry state is more readily reduced to a powder, while in the wet state it may be reduced to a fine colloidal particle size.”

It is evident that the depolymerized cellulose molecule which has been stripped of soluble sugars or short chain polymers, which have been cleaved from the original cellulose fibers, are not comminuted cellulose fibers which are polymeric, as stated by Jones et al. and well known to those skilled in the art. Jones et al state: “Cellulose, a high polymer of glucose, is composed of crystalline (highly ordered) and amorphous (low ordered) regions. During hydrolysis, acid penetrates the less organized or amorphous areas of the fiber at a rate greater than into the crystalline areas. These low ordered regions are cleaved to sugars or short chain polymers which are soluble and thus removed, leaving only the highly ordered crystalline regions of the fiber.” ( see page 11, left hand column).

The authors choose to refer to a “depolymerized molecule” and cellulose which is “chemically cleaved” by “chemical degradation” as a molecule which is “not a chemical derivative.” The authors clearly state that the resulting MCC is microcrystalline depolymerized cellulose. Comminution of cellulose fibers cannot depolymerize them. The comminuted fibers which contain both crystalline and amorphous regions are distinctly different from depolymerized microcrystalline cellulose which is solely crystalline; and fibers produced by comminution are not produced by a selective chemical

interaction such as acid hydrolysis.

3. I am a co-inventor in the following U.S. Patents:

4,290,912 Volatile Corrosion Inhibitor  
4,215,682 Melt-blown Fibrous Electrets  
4,172,122 Substantive Sunscreening Compositions

4. During the course of my investigations in various fields of chemistry I have studied numerous journal articles and patents and have understood that terms used therein are accorded their usual and ordinary meaning. It is clear to me that a molecule which is chemically degraded so as to allow portions which are chemically cleaved to be removed, means exactly what it says. The original molecule has been cleaved and therefore is not the same molecule it was before it was cleaved. Such a molecule which has sugars or short chain polymers removed from it, is readily distinguishable over a fragment of a fiber derived by comminuting the cellulose molecules which have not been contacted with any chemical which might alter it.

I understand "comminuted" fibers to mean that the fibers are reduced to a powder by cutting, grinding, pounding or other mechanical means.

The undersigned declarant declares further that all statements made herein of his own knowledge are true, and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 3/14/66

  
Donald Alfons Kubik